REMARKS/ARGUMENTS

Applicant appreciates the consideration shown by the Office, as evidenced by the Office Action mailed on 21 June 2006. In that Office Action, the Examiner objected to claim 52 and rejected claims 19-76 and 78-79. After consideration of the Office Action, claims 20, 37, 52, and 68 have been amended, claims 19, 21, and 78 have been canceled, and claims 80 and 81 have been added. Claims 20, 22-76 and 79-81 are under consideration in the present application. Applicant respectfully requests reconsideration of the application by the Examiner in light of the above amendments and the following remarks.

Informality – claim 37

Claim 37 has been amended to correct a spelling error.

Objection – claim 52

Claim 52 was amended in the manner suggested by the Examiner to overcome the objection.

Gessinger – claims 19-21 and 23-30

Claims 19-21 and 23-30 were rejected under 35 USC 102(b) over Gessinger et al. US4380574. Applicant has amended claim 20 to include the subject matter of claim 21 and canceled claim 19.

Applicant submits that Gessinger does not disclose Applicant's claim 20 recitation of:

> the diffusion-controlling layer is a metal selected from the group consisting of pure metals or alloys that do not form brittle and/or low melting phases due to interaction with the erosion resistant protective structure or the substrate.

Although an interlayer diffusion barrier is referenced in Gessinger in column 4, lines 53-54, no description of properties of such a diffusion layer is provided by Gessinger.

Accordingly, Applicant respectfully submits that claim 20 and claims 23-30 which depend therefrom define allowable subject matter over Gessinger.

EP077 – claims 19-35 and 67

Claims 19-35 and 67 were rejected under 35 USC 102(b) over EP1054077 (EP077). As discussed above, Applicant has amend claim 20 to include the subject matter of claim 21 and canceled claim 19. Claim 67 already included the above-quoted recitation of claim 20. EP077 does not describe avoidance of brittle and/or low melting phases. EP077 references a number of potential materials at column 5, lines 10-20:

> The barrier layer 24 comprises silica, titanium nitride, titanium aluminium nitride or alumina. Other suitable barrier layers are aluminium, cobalt, nickel, iron, silicon, niobium and alloys or compounds of these elements. The barrier layer 24 prevents interdiffusion between the titanium aluminide 10 and the protective austenitic stainless steel coating 20 which may result in the formation of undesirable phases at the interface between the titanium aluminide 10 and the protective austenitic stainless steel coating 20.

Applicant submits that, for the material sets which are quoted, the resulting structures would include brittle portions and would not avoid low melting phases.

Accordingly, Applicant respectfully submits that claim 20, claims 22-35 which depend therefrom, and claim 67 define allowable subject matter over EP077.

Gessinger and EP077 – claim 22

Claim 22 was rejected under 35 USC 103(a) over Gessinger and EP077. Claim 22 depends from claim 20 which Applicants believes to be in condition for allowance over Gessinger and EP077 for the reasons described above regardless of whether EP077 references niobium.

EP077 – claim 36

Claim 36 was rejected under 35 USC 103(a) over EP077. Claim 36 depends from claim 20 which Applicant believes to be in condition for allowance over EP077 regardless of whether particle size is taught or suggested by EP077.

EP077 and WO102 – Claims 37-51

Claims 37-51 were rejected under 35 USC 103(a) over EP077 in view of WO99/66102 (WO102). Claim 35 includes diffusion layer description language similar to that of above-discussed claims 20 and 67 and is believed to be in condition for allowance over EP077 for that reason. The Office Action appears to cite WO102 for process parameter descriptions. Even if some of the process parameters overlap, the diffusion layer description recited in claim 37 is not taught or suggested by any combination of EP077 and WO102.

Furthermore, Applicant notes that WO102 emphasizes the importance of a reaction zone layer which would be incompatible with a diffusion-controlling layer. Please see, for example, page 4, lines 17-35 (with emphasis added):

> The surface to be plated is preferably of such material that the **reaction layer formed during hot pressing at the boundary layer between the plating material and the surface to be plated** will bind the plating to the surface to be plated. (page 4, lines 17-21).
>
> The surface to be plated is preferably made of austenitic steel. When NiTi is hot-pressed onto the surface of austenitic steel at correct temperature and pressure, a reaction layer is formed at the boundary layer between steel and NiTi that binds the plating to the steel surface extremely well. (page 4, lines 22-28).
>
> By the method of the invention, various objects can be easily NiTi-plated so that the plating shows a microstructure and properties characteristic of the pseudoelasticity of NiTi. When objects are plated by the method of the invention, a reaction layer allowing excellent plating adhesion can be created at the boundary layer between the object to be plated and the plating material. ….

Applicant respectfully submits that it would not be obvious to combine teachings of the two disclosures which have fundamentally different goals and approaches (promoting diffusion with a reaction layer vs. preventing it with a diffusion-controlling layer). Applicant notes the Examiner's additional comments in the Office Action and addresses them below with respect to the rejection of claims 19-76 and 78-79 under WO102 and EP077.

Accordingly, Applicant respectfully submits that claim 37 and claims 38-51 which depend therefrom define allowable subject matter over EP077.

EP077 and WO102 – Claims 52-66

Claims 52-66 were rejected under 35 USC 103(a) over EP077 and WO102. Claim 52 includes diffusion layer description language similar to that of above-discussed claims 20, 37, and 67 and is believed to be in condition for allowance over EP077 for that reason.

The Office Action again appears to cite WO102 for process parameter descriptions. Even if some of the process parameters overlap (or be adjustable with respect to) the diffusion layer description recited in claim 37 is not taught or suggested by any combination of EP077 and WO102. Furthermore, as discussed above with respect to claim 37, Applicant notes that WO102 emphasizes the importance of a reaction zone layer which would be incompatible with a diffusion-controlling layer.

Applicant respectfully submits that claim 52 and claims 53-66 which depend therefrom define allowable subject matter over EP077.

EP077 – Claims 68-76 and 78-79

Claims 68-76 and 78-78 were rejected under 35 USC 103(a) over EP077. Claim 68 has been amended to include the subject matter of claim 78 (now canceled). Claim 68, as amended, includes diffusion layer description language similar to that of above-discussed claims 20, 37, 52, and 67 and is believed to be in condition for allowance over EP077 for that reason. Claims 69-76 and 79 each depend from claim 68.

WO102 and EP077 – claims 19-76 and 78-79

Claims 19-76 and 78-78 were rejected under 35 USC 103(a) over WO102 and EP077. Claims 19, 21, and 78 have been canceled. Applicant respectfully traverses the rejection of the remaining claims under 35 USC 103(a) over WO102 and EP077. Applicant respectfully submits that the applied references do not teach, suggest, or disclose (either individually or in combination) the independent claim 20, 37, 52, 67, and 68 recitations. In particular, the recitations missing from the applied references include a diffusion-controlling layer between a substrate and an erosion resistive protective structure comprising a shape-memory alloy or shape memory alloy composite with the diffusion layer comprising a metal selected from the group consisting of pure metals or alloys that do not form brittle and/or low melting phases due to interaction with the erosion resistant protective structure or the substrate.

As the Office Action states, WO102 does not teach or suggest a diffusion-controlling layer between the substrate surface and an erosion-resistant sharp memory alloy layer. Furthermore, as discussed above with respect to claim 37, Applicant notes that WO102 emphasizes the importance of a reaction zone layer which would be incompatible with a diffusion-controlling layer. Additionally, as discussed above with respect to claims 19 and 67, EP077 does not teach or suggest the specific recitation in the independent claims regarding the type of diffusion layer.

EP077 appears to relate to providing an oxidation and corrosion resistant protective coating (not “erosion” protection) on a titanium alloy article with the coating comprising austenitic steel and with a barrier layer between the article and the coating (paragraphs 9 and 13) to prevent interdiffusion.

Whereas the WO102 reference appears to promote the importance of a reaction at the boundary between the coating and the article, the goal of the EP077 reference is to remove any reaction (phase at the interface). For this reason, Applicant respectfully submits that there would have been no motivation to modify the WO102 reference to include the barrier layer concept of the EP077 reference and that, as discussed above, the EP077 reference does not teach or suggest the specific recitations regarding the claimed diffusion layer.

The Office Action included a "Response to Arguments" portion which stated on Page 10:

> In contrast to Applicant's argument, it is believed that EP'077 does not in fact teach away from a reaction layer formed during hot pressing as described by WO'1 02. EP'077 does teach use of layers similar to those described by WO'102, with the primary difference being the existence of a diffusion barrier, all subjected to hot isostatic pressing as described above. The hot isostatic pressing serves to adhere the layers together and thus serves the same purpose as taught by WO'102 (the formation of a reaction layer between the surfaces to "bind the plating to the surface to be plated" -page 4, lines 17-21). While EP'077 does teach reduction/prevention of interdiffusion of the layers, it does not teach away from adhesion of the layers in a reaction layer between the materials. In fact, such a reaction layer is essential in the hot isostatic pressing process taught to form their invention. Therefore the prior rejections are maintained.

Applicant respectfully traverses the above paragraph and submits that the reaction zone referenced in WO102 is not merely a "pressing" and more specifically is a chemical reaction zone wherein a new phase is created. This chemical reaction / new phase is exactly what the EP077 is trying to avoid, as can be seen from the last section of the above quoted EP language in column 5 wherein a goal is the **prevention** of "formation of undesirable phases at the interface between the titanium aluminide 10 and the protective austenitic stainless steel coating 20."

Furthermore, as discussed above, the applied references do not teach or suggest the specific recitation of the diffusion layer comprising a metal selected from the group consisting of pure metals or alloys that do not form brittle and/or low melting phases due to interaction with the erosion resistant protective structure or the substrate.

Accordingly, Applicant respectfully submits that claim 20, claims 22-36 which depend therefrom, claim 37, claims 38-51 which depend therefrom, claim 52, claims 53-66 which depend therefrom, claim 67, claim 68, and claims 69-76 and 79 which depend therefrom define allowable subject matter over the applied art. Withdrawal of the rejections is respectfully requested, and allowance of the claims is respectfully solicited.

<u>New claims 80 and 81</u>

Support for these claims can be found in Applicant's specification paragraphs 48 and 49, for example. These claims depend from claim 20 and are believed to be in condition for allowance for the reasons discussed above. Furthermore, additional recitations are included that Applicant believes to be missing from the applied art.

WO appears to relate to application of NiTi platings over large surfaces to be plated by hot pressing and indicates that the surface to be plated (substrate) is preferably of austenitic steel (page 4, lines 22-23).

Gessinger and EP077 both appear to relate to substrates comprising titanium alloys.

Gessinger appears to describe NiTi alloys as the coating but does describe the specific structure recited in claim 80, and Gessinger does not appear to describe the diffusion-controlling material of claim 81.

EP077 appears to describe austenitic steel as the coating and provides a laundry list of potential barrier layers between the blade and the coating as:

> The barrier layer 24 comprises silica, titanium nitride, titanium aluminium nitride or alumina. Other suitable barrier layers are aluminium, cobalt, nickel, iron, silicon, niobium and alloys or compounds of these elements. The barrier layer 24 prevents interdiffusion between the titanium aluminide 10 and the protective austenitic stainless steel coating 20 which may result in the formation of undesirable phases at the interface between the titanium aluminide 10 and the protective austenitic stainless steel coating 20

Applicant submits that the fact that Nb was listed as a potential material for use between titanium aluminide and an austenitic steel does not make it obvious to insert between a titanium alloy and a coating of NiTiCr and/or NiTiFe.

Summary

Should the Examiner believe that anything further is needed to place the application in better condition for allowance, the Examiner is requested to contact applicant's undersigned representative at the telephone number below.

Respectfully submitted,

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